

REMARKS

The Applicant respectfully requests reconsideration and allowance of Claims 1 through 29 in view of the following arguments and the above amendments.

THE CLAIM AMENDMENTS

Claims 1, 15, 21, and 26 are amended above to clarify that a "divertible operation" is a file access operation in the file system. The Applicant submits that the original claim language specified that the divertible operations were in fact file access operations for the file system considering the definition of "divertible operation" included in the original disclosure. However, the above amendments as to the nature of the divertible operations are intended to remove any issue as to the nature of the operations.

Claims 15 and 26 are also amended to clearly include the limitation that the divertible operations are "diverted" from the file system processes. These amendments bring claims 15 and 26 in line with the language used in claim 1.

THE CLAIMS ARE NOT OBVIOUS IN VIEW OF THE 682 AND 459 PATENTS

The Examiner rejected Claims 1-10, 12, 13, 15, 21, and 26 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,442,682 issued to Pothapragada, et. al ("682" or "the 682 Patent") in view of U.S. Patent No. 5,857,459 issued to Taoda ("459" or "the 459 Patent"). The Applicant submits that the claims are not obvious in view of the proposed combination of references on the ground that the proposed combination does not teach or suggest each and every element required in the present claims.

1 The present invention, as defined in each of the independent claims, claims 1, 15, 21, and
2 26, represents a fundamental departure from the prior art in the manner in which file system
3 access operations, that is, operations on or for a file defined by a file system, are processed. As
4 set out clearly in the present application with reference to Figure 1, the prior art handles file
5 access operations in the following general process. First, a file system user or client initiates a
6 file system access operation request which is communicated to file system processes associated
7 with a storage device or storage system. A file system access operation specified in the request is
8 then processed through the file system processes associated with the storage device or storage
9 system. These file system processes ultimately communicate instructions to the storage device
10 processes which are actually responsible for physical access to the data storage device or devices.

11 In contrast to this prior art model for file system access to a storage device, the present
12 invention diverts certain file system access operations from the file system processes associated
13 with the data storage device so that the data storage device processes may perform the file system
14 access operation directly. The file system access operations that are diverted according to the
15 invention are defined as "divertible" operations in the present application a the bottom of page 4
16 and top of page 5. The diversion of a file system access operation from the file system processes
17 is required in the following claim elements:

18 Element (c) of claim 1

19 “(c) if the file system access operation request specifies a divertible operation,
20 diverting the divertible operation from file system processes associated
21 with the data storage device to the array controller processes”

22 Element (a) of claim 15

1 “(a) operation detection program code for detecting file system access operations
2 comprising divertible operations and file system access operations comprising
3 non-divertible operations in a received file system access operation request, and
4 for diverting divertible operations from file system processes associated with a
5 data storage device”(as amended above)

6 Element (b) (ii) of claim 26

7 “(b) data processing means for,”

8 “(ii) if the file system access operation request includes a divertible operation,
9 diverting the divertible operation from file system processes associated with the
10 data storage device to array controller processes executed by the data processing
11 means” (as amended above).

12 It will be noted that a “file system access operation request” is defined in the disclosure as
13 “a computer readable code representing a request for a particular file system operation involving
14 a file.” (Page 4, lines 24-26). The disclosure further lists “operations to create, delete, open,
15 close, read, or write a file” as file system access operations. It is clear from the definition and
16 examples that a “file system access operation” referenced in the claims is not just any operation
17 involving data. Rather, a “file system access operation” as used in the present claims refers to an
18 operation on or for the file system for a particular file defined in the file system. Thus, a “file
19 system access operation” is easily distinguished from prior art communications from file system
20 processes to array controller processes to instruct the array controller processes to take some
21 action in the physical storage media. These prior art instructions from the file system processes
22 to the array controller processes are not “file system access operations” under the definitions used
23 in the present application. Even aside from the definitions used in the present application, the

1 Applicant submits that those skilled in the art of file systems and storage device controllers
2 would understand a "file system access operation" to mean an operation from a file system user
3 or client on or for the file system and not any instruction produced by file system processes for a
4 storage device controller.

5 The Applicant also notes that the present application defines a "divertible operation" as
6 "file system access operations which are of the type or class diverted from the file system
7 processes to the array controller processes according to the invention" (Page 4, lines 30-33). The
8 disclosure also makes it clear that this class or type of operation may be defined by any file
9 attribute or set of attributes. Thus, the designation "divertible operation" is simply used in the
10 claims as a shorthand way of referencing a file access operation that is of the type of class that is
11 "diverted" according to the invention.

12 The Applicant finally notes the plain meaning of the word "divert" used in the present
13 claims. Webster's Third New International Dictionary of the English Language Unabridged
14 defines the word "divert" as: to turn aside, go different ways, differ; to turn aside from a course
15 or purpose; deviate; digress; to turn from one course, direction, objective, or use to another; to
16 turn or draw from one occupation or concern to another. The only other use of the word "divert"
17 listed in the referenced dictionary is in the sense of giving pleasure or amusement, or
18 entertaining, which is clearly not relevant to the present application.

19 Given the plain meaning of the word "divert" and the plain meaning and specific
20 definition of "file system access operation," and from the specific definition of "divertible
21 operation" in the disclosure, it is clear that the limitation of "diverting the divertible operation
22 from file system processes associated with the data storage device to the array controller
23 processes" appearing in claim 1 means that the file system operation is turned to the array

1 controller processes from its course to or through the file system processes. This step of
2 diverting or turning the course of the file system operation from the file system processes to the
3 array controller processes is simply not disclosed in any reference of record in the present
4 application or any combination proposed by the Examiner, nor is the step taught or suggested by
5 the prior art referenced in Figure 1 of the present application.

6 The prior art referenced in Figure 1 directs the file system access operation to the file
7 system processes, the file system processes then perform the operation by making the appropriate
8 changes in the file system data management arrange, and sending any appropriate instruction
9 (which is by definition, not a file system access operation) to the array controller. There is
10 simply no diversion of the file system access operation from the file system processes in the prior
11 art described with reference to Figure 1 in the present application, nor is there any suggestion that
12 the array controller processes perform the divertible operation (file access operation) as required
13 in element (d) of claim 1.

14 As for the prior art combination cited in the Final Office Action, the 682 Patent merely
15 discloses a method and apparatus for tuning or configuring a file system based on an analysis of
16 file system user data. There is no suggestion that any file system access operation in the system
17 disclosed in the 682 Patent is in any way diverted from the file system processes and performed
18 by array controller or storage device processes. The step shown at 308 in Figure 1 of the 682
19 Patent refers only to branching to optimize the file system if the analysis of user data indicates
20 the user commonly performs a certain type of file system operation. The process described in
21 Figure 1 of the 682 Patent does not even refer to a process of actually processing a file system
22 operation, but only configuring the file system in preparation for performing a file system
23 operation as clearly disclosed at Col. 5, lines 29-31 of the 682 Patent. The text at Col. 7, lines

1 13-30 of the 682 Patent cited by the Examiner as teaching the step of performing a divertible
2 operation (that is, a file system access operation) by array controller processes, in fact describes
3 only configuring the file system processes to optimally process a certain type of file system
4 access operation. This text does not in any way teach or suggest performing a file system access
5 operation, as defined in the present application, with array controller processes.

6 The 459 Patent also does not teach or suggest any diversion of file system access
7 operations from file system processes to array controller processes. Rather, the 459 Patent
8 merely discloses a process in which the data for files in a file system are stored differently
9 depending upon whether the file is a large file or a frequently accessed file. In fact, the 459
10 Patent does not teach or suggest diverting any file system access operation, but merely physically
11 storing certain data differently in an array of disks depending upon the nature of the file:

12 For all of these reasons, the Applicant respectfully submits that claim 1 is clearly not
13 obvious in view of the 682 Patent and the 459 Patent, and is also clearly not obvious in view of
14 the prior art described with reference to Figure 1 of the present application, and is entitled to
15 allowance together with its dependent claims, claims 2 through 14. The above arguments with
16 regard to claim 1 apply with equal force to independent claim 15 for a program product, and
17 independent claim 26 for an apparatus. Thus, claims 15 and 26 together with their respective
18 dependent claims are entitled to allowance over the 682 Patent and the 459 Patent.

19
20 Claim 21

21 Independent Claim 21 is directed to a program product for servicing file system access
22 operation requests from a file system client to a file system that includes a file system data
23 management arrangement which contains information on each file in the file system. Rather than

2 program code

1 program code for "diverting" a file system access operation from file system processes to array
2 controller processes, claim 21 requires at element (a) operation detection program code for
3 detecting file system access operations comprising divertible operations in a file system access
4 operation request received from a file system client, and for preventing each divertible operation
5 from being performed by the file system. Element (b) of claim 21 then requires array controller
6 program code for performing each divertible operation, managing a data storage device including
7 data storage media, and communicating with the file system program code to update the file
8 system data management arrangement in response to the performance of the respective divertible
9 operation.

10 The 682 Patent does not teach or suggest any program code for preventing a file system
11 operation from being performed by the file system processes. The 682 Patent also does not
12 suggest any program code other than the file system processes for performing a file system access
13 operation. The 459 Patent, again, does not make up for these deficiencies in the 682 Patent.
14 Although the 459 Patent does detect certain types of files to be stored and stores them differently
15 from other files, the 459 Patent does not in any way suggest any code for preventing the file
16 system from performing any file system access operation.

17 For these reasons the Applicant submits that Claim 21 is entitled to allowance over the
18 cited references together with its dependent claims, Claims 22 through 25.

19
20 THE CLAIMS ARE NOT OBVIOUS OVER THE 682 AND 459 PATENTS, FURTHER IN
21 VIEW OF THE VENKATESH PATENT

22
23 The Examiner rejected Claims 11, 14, 17, 23 and 27-29 under 35 U.S.C. § 103(a) as
24 being unpatentable over the 682 and 459 Patents, further in view of U. S. Patent 5,974,503 to

1 Venkatesh et al. ("503" or the "503 Patent"). The Applicant respectfully submits that the
2 indicated claims are not obvious in view of the cited references on the ground that the proposed
3 combination does not include each element required in the respective claim.

4 The 503 Patent discloses a method and data storage system for maintaining continuous
5 media files such as video files in a RAID system. The disclosure in the 503 is primarily directed
6 to how the continuous media files are allocated across media in the RAID system. The 503
7 Patent does not teach or suggest any arrangement for diverting file system access operations from
8 the file system processes and performing the file system access operation with array controller
9 processes as required in independent claims 1, 15, and 26 and their respective dependent claims.
10 The 503 Patent also does not teach or suggest program code for prevented file system access
11 operations from being executed by the file system processes and array controller program code
12 for executing the file system access operation in lieu of the file system processes as required by
13 claim 21 and its dependent claims. *not relevant! 503 not
relied on
diverting*

14 For all of these reasons, nothing in the 503 Patent makes up for the deficiencies of the
15 682 Patent and 459 Patent with respect to the independent claims. Thus, the Applicant submits
16 that all of the present claims are allowable over the 682, 459, and 503 Patents.

17 The Examiner cited the 503 Patent specifically against the conversion operation required
18 in Claims 11, 17, and 23, noting language at Col. 40, lines 35-45 of the 503 Patent. It is noted
19 that the referenced paragraph at Col. 40 in the 503 Patent does not suggest converting a file
20 system access operation from a byte offset operation to a block access operation. The conversion
21 referenced in that paragraph is from a block access to a time position within a file for a video
22 segment.

23 *- same thing?*

1 THE EXAMINER'S RESPONSE TO ARGUMENTS

2 At page 9 of the Final Office Action the Examiner disagreed with the statement in the
3 office action response of July 16, 2003, that "the 682 Patent does not teach or suggest handling
4 file system requests differently on a request by request basis depending upon the nature of the
5 request." The Applicant stands by the statement as being a correct characterization of the 682
6 Patent. However, it is true that the more important point with regard to the 682 Patent is that it
7 does not teach or suggest diverting any file system access operation from file system processes to
8 array controller processes, contrary to the Examiner's statement at the bottom of page 2 of the
9 Final Office Action.

10 At the top of page 10 of the Final Office Action the Examiner indicated disagreement
11 with the argument at page 3 and page 5 of the July 16, 2003 response regarding the step of
12 diverting "divertible operations" from the file system processes. In explaining the Examiner's
13 position, the Examiner refers to "divertible files." In response to these comments, the Applicant
14 notes that the claims refer to "divertible operations" which are clearly defined as file system
15 access operations in the disclosure. Thus, the present claims (1, 15, and 26 and their dependent
16 claims) require "diverting" file system access operations from the file system processes to the
17 array controller processes. This diversion of file system access operations is simply not taught or
18 suggested by any prior art reference or combination of references, and is also very clearly not
19 taught or suggested by the prior art described with reference to Figure 1.

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1 CONCLUSION

2 For all of the above reasons, the Applicant respectfully requests reconsideration and
3 allowance of Claims 1 through 29

4 If the Examiner should feel that any issue remains as to the allowability of these claims,
5 or that a conference might expedite allowance of the claims, she is asked to telephone the
6 undersigned attorney.

7 Respectfully submitted,

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10 Date: 12-3-03

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21 I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office, (Fax
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